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ABSTRACT

A survey was undertaken in an effort to understand the basis on which some children choose mathematics and science courses and others opt out. Interviews were conducted in classrooms with 2,500 public school students in grades 5 through 11, and 1,000 telephone interviews were conducted with parents. The survey found that most students make decisions about future math courses with limited or no academic guidance from their schools, and, in most cases, parents are not informed about why these decisions are necessary. Only one-third had participated or planned to participate in choosing their children's math courses. Over half of all students planned to drop math and science at the first opportunity. Students frequently did not understand the need to take mathematics and science courses for academic and job preparation; minority students were more likely to experience a limited curriculum. Data indicate that the interests of minority students in math and science are not being encouraged by their teachers, even though they are the students who may be most in need of guidance. (Contains 12 graphs.) (SLD)

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ED 387 578

Uninformed Decisions:

A Survey of Children and Parents About Math and Science

by Robert Leitman, Katherine Binns and Akhil Unni

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NACME

June 1995 Volume 5, Number 1

Research Letter

Highlights

- Most public school students make important decisions about future math courses with limited or no academic guidance from their school. only one-third of the students who already made a choice say their math teachers participated in this decision and only one-sixth of students say guidance counselors participated in the decision. Four in five students (79%) who have had options regarding math say they made decisions by themselves about which courses to pursue, if any.
- Most parents (93%) are never informed about why these decisions must be made and only one-third have or plan to participate in choosing their children's math courses. When parents become involved, it is most likely they have been through the college preparation process and have attended college themselves (50%); in sharp contrast to one in four (24%) parents with no personal knowledge or experience of college entrance requirements.
- Over half of all students plan to drop math and science at the first opportunity. In discussing mathematics, 63 percent of African American, 60 percent of Latino, and 58 percent of American Indian students express this intention.
- Most students (88%) believe that advanced math skills are required for certain jobs or careers. Ironically, they are less likely to understand that without certain math skills their job possibilities will be limited; more than half (55%) of nonminority students understand this while only 33 percent of minority students do.
- African American (27%) and American Indian (29%) students are least

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Uninformed Decisions:

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Introduction

NACME's mission is to increase the number of African Americans, Latinos and American Indians in the nation's engineering workforce. But only six percent of all minority students, nationwide, graduate from high school with the prerequisite sequence of mathematics and science courses to undertake an engineering education or any other college-level technical degree—effectively barring them from participating in a large and growing sector of the economy. For nonminority students, the proportion is significantly better, but still under 12 percent. To inform children and their parents directly that they must choose academic track math and science in high school to keep their career options open, NACME is mounting a national public service advertising campaign that will bring the persuasive power of the media to bear on the decisions students make.

In recent years, public attention has focused on the American education system and its general failure to prepare students adequately for careers that require advanced math and science skills. Yet there has been relatively little notice given to the educational prerequisites of these types of higher education programs and professional careers, or to the extent to which children and their parents understand these academic requirements.

NACME asked Louis Harris and Associates, Inc. to undertake this study in an effort to understand the basis upon which some children choose math and science and others opt out. In particular, this survey focuses on knowledge of and attitudes toward primary and secondary school math and science education, with a special emphasis on minority students and parents.

The Survey

This survey includes nationally representative samples of public school students in the 5th to 11th grades—including children in Bureau of Indian Affairs schools—and parents whose children currently attend public school (from K to 12th grades).

Interviews were conducted in the classroom with 2,500 public school students. The student sample is further broken down into a national cross section and an oversample of schools with higher than average proportions of minority students. For the purposes of this survey, and throughout this report, minority students are specifically defined as African American, Latino and American Indian students.

One thousand telephone interviews were conducted with parents. The

Robert Leitman is executive vice president, Katherine Binns is vice president and Akhil Unni is research associate for Louis Harris and Associates, Inc.

Highlights, *continued from page 1*

likely to understand that by not taking certain math courses, such as algebra, they are limiting their future academic options. Minority students in grades nine to eleven (20%) and grades five to eight (21%) are somewhat more likely than nonminority students (16% and 13%) to think they can take any class at any time in their academic careers without completing prerequisite courses.

- These misconceptions are underscored by the frequency with which students express an interest in learning more about professions that require math and science skills. The level of interest in technical careers is particularly high among older minority students who are also more likely to leave high school without the guidance, support and academic prerequisites to achieve in these fields. This inconsistency between potential career interests and current course-taking plans may have enormous consequences as students approach the 21st century job market.
- Two in five students say that discouragement from guidance counselors and teachers is an important reason their peers do not pursue math studies; boys and young men (48%) and American Indian students (48%) express these views most often. These same students are more often discouraged by a teacher or guidance counselor from pursuing advanced courses.
- Only half of older minority students, compared to two-thirds of their nonminority peers, have been encouraged by their teachers to take advanced classes.
- A limited curriculum often hinders students who might otherwise pursue more advanced math and science studies. Younger (45%) and older (40%) minority students are more likely than their nonminority peers (41% and 32%, respectively) to cite a lack of course offerings as an important reason most or some students in their schools stop studying math and science.

sample of parents includes a representative national cross section of 850 parents and a nationally representative oversample of 150 African American, Latino and American Indian parents.

The Harris research team would like to thank George Campbell Jr., Ph.D., NACME's president, Ronni Denes, vice president, research, policy and public affairs, and Catherine Morrison, director, research, for all their help and expert advice in designing this survey. Louis Harris and Associates, Inc. is responsible for the final determination of topics, question wordings, collection of actual data, and analysis and interpretation of the findings.

All Louis Harris and Associates, Inc. surveys are designed to adhere to the code of standards of the Council of American Survey Research Organizations (CASRO) and the code of the National Council of Public Polls (NCPP). A complete report is available for a nominal fee by contacting NACME, Inc.

Dropping Math and Science

Despite a job market that increasingly requires higher-level skills in mathematics and science, the children in America's schools express a widespread eagerness to stop taking these courses. Among all 5th to 11th grade public school students, half (51%) say they will only take math as long as required. Roughly half of both boys and girls (53% and 50%, respectively) admit that they plan to stop taking math classes as soon as they can. Greater divergence is seen when the data are examined by ethnicity. Less than half of white and Asian students plan to drop math, in contrast to fully three-fifths of Latino, African American, and American Indian students, who intend to take math only for as long as is necessary (see Figure 1).

These views are common among students of all ages: 54 percent of 5th to 8th graders and 48 percent of 9th to 11th graders will only study math for as long as necessary.

Nearly half (47%) of all 5th to 11th grade students say they will only study science for as long as it is required. This opinion is also most widely held among African American (59%), American Indian (58%) and Latino (54%) students. By comparison, less than half (43%) of nonminority students intend to drop science as soon as they can (see Figure 2).

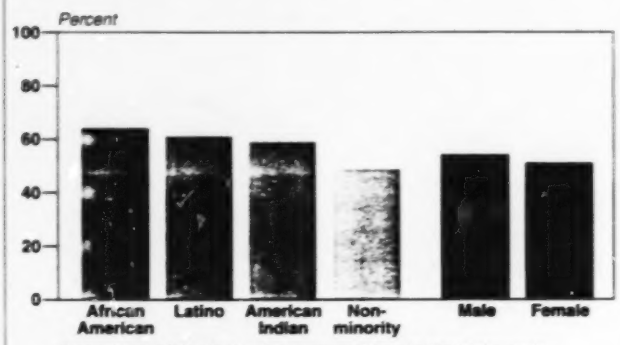
These differences of opinion are consistent regardless of age, as 54 percent of minority 9th to 11th graders and 58 percent of 5th through 8th graders say they will only study science as long as it is required, compared to 45 percent of nonminority 9th to 11th graders and 42 percent of 5th through 8th graders.

Decisions in the Absence of Advice

Students are largely making these important academic decisions with little or no guidance or advice from adults. Four in five students (79%) who have had math options say they made their decisions by themselves about which math courses to pursue. Although parents are less likely to say students make these kinds of decisions by themselves, two-thirds (66%) of parents still say their children have made decisions about math courses by themselves. Only one-third (36%) of students say their math teachers have advised them on which math classes they should take, and only one in 20 parents (5%) believe a math teacher has participated in their child's decision. Furthermore, only one-fourth (27%) of students and one-fifth (19%) of parents believe a guidance counselor has helped with this decision. One-third of students (34%) and parents (32%) say that a parent or guardian has participated in decisions about which math courses a child should take.

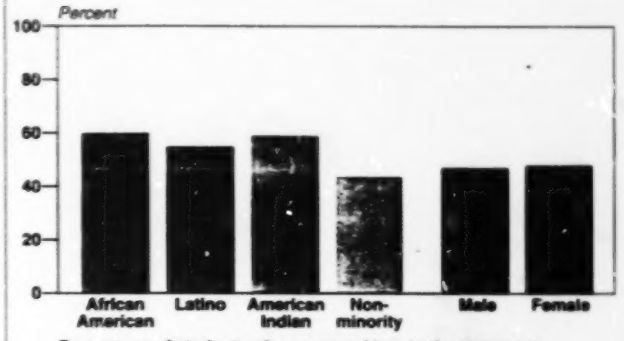
Although they are making these decisions in relative isolation, students still claim to seek advice from a variety of sources to help decide on math and science courses. Virtually all (94%) students say that advice from parents or guardians is important to them when deciding what to study in school. Nine in ten students also cite teachers and college represen-

Figure 1.
Planning to Drop Math



Percentage of students who answered true to the statement: "I will only take math classes for as long as I have to."

Figure 2.
Planning to Drop Science



Percentage of students who answered true to the statement: "I will only take science classes for as long as I have to."

tatives as important sources of advice. In addition, fully three-fourths (76%) of students feel that advice from guidance counselors is important and majorities cite other family members (77%), school principals (64%), friends (63%), and coaches (50%) as important sources of advice for deciding on courses.

Impact of Choices Remains Unexplained

Although students express a strong desire for advice and guidance they do not seem to receive an adequate response. Sizable numbers of students are not being told about the future academic implications of their decisions regarding math and science studies. And parents seem to rely on their personal experiences or their own initiative to guide them rather than on the advise and guidance of school staff.

Two-thirds of 9th to 11th grade students (68%) who have had to make decisions about studying math report that someone explained how those decisions would affect later course options. However, roughly one-third of female students (31%), and Latino students (34%) maintain that no one has explained the repercussions of these decisions on their future academic options.

Only half (53%) of all parents who say their children have had math options confirm that the future impact of their children's choices was explained to them and their children. One in ten parents (12%) believes these choices were explained only to his or her child. One-third of parents say (33%) that no one has explained to either them or their children how these academic decisions affect future academic options.

Getting Reasons for Future Choices

More than half of all students who have not yet chosen between an academic or non-academic track, or no math at all, say that no one has explained the reasons why they will make decisions about math studies sometime in the future. Fifty-three percent of young minority students, and 52 percent of young nonminority students say no one has spoken to them about their academic options regarding math courses or about the impact this will have on their future. Students who plan to pursue more advanced math are more likely than those who plan to drop math to report that someone explained why they will have to make choices about math classes.

Nine in ten (93%) parents whose children will be presented with academic options in the future say that no one has talked to them about why their children will have to make these decisions. Only one in twenty (5%) of these parents says that someone has spoken to them and their children about these decisions. These proportions are equally low among parents, regardless of their gender, race or ethnicity.

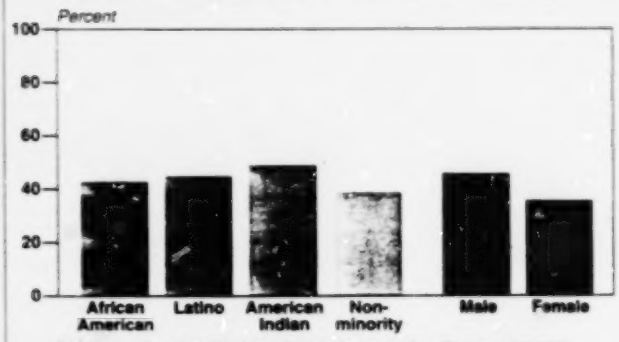
Discouraged by Teachers and Counselors

As they allow their children to make academic decisions on their own, parents often underestimate the negative influence that adults may have on their children's decisions. Two in five (40%) students believe that at least some students do not pursue math and science studies because teachers and guidance counselors have discouraged them. In comparison, only 25 percent, of parents believe that some or many students do not pursue math and science studies because of such discouragement.

Boys (48%) and American Indian students (45%) are more likely than others to believe their peers do not pursue math and science because they have been discouraged by teachers and guidance counselors. By comparison, only one-third (35%) of girls believe that discouragement from teachers and guidance counselors motivates at least some students to not study math and science (see Figure 3). Older minority students are more likely than their nonminority classmates to believe that discouragement is a contributing factor for at least some students' decisions not to study math and science (43% vs. 34%).

Unlike students, most parents (70%) do not recognize that discouragement from teachers and guidance counselors plays a role in students' decisions not to

Figure 3.
Teacher and Guidance Counselor Discouragement



Students who identified teacher and counselor discouragement as an important reason that students decide not to take advanced math and science courses.

pursue math and science studies (see Figure 4). Parents without a college education are least likely to believe this statement is true (22%), while nearly one-third of parents with higher levels of education (29% of those with a college education and 30% of those with some college) believe this to be an important reason students do not continue their math and science studies.

Students' Negative Personal Experiences

Sizable proportions of 5th to 8th graders maintain that their friends (19%), parents or guardians (17%), teachers (15%), family members (13%), guidance counselors (11%), or school principals (10%), have discouraged them from succeeding in math and science studies. Only 50 percent of students say that none of these adults have discouraged them from doing well in math or science courses.

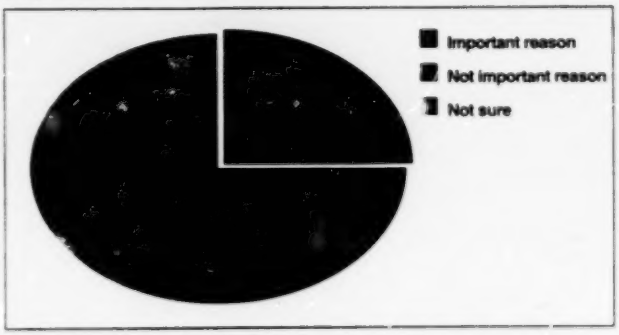
Of middle school students, it is most alarming to note that 26 percent of American Indian and 21 percent of African American students believe they have been discouraged by their teachers. By comparison, only 15 percent of Latino and nonminority students report that a teacher has been discouraging about their work in math or science. Similarly, African American and American Indian 5th to 8th graders are more likely than other students to feel they have been discouraged by guidance counselors about their work in math and science. While over half (55%) of nonminority students say that no one has discouraged them, smaller proportions of Latino (43%), African-American (38%), and American Indian (27%) students say that no one has discouraged them from succeeding in their math and science studies (see figure 5).

Students who plan to drop math and those who are not interested in taking advanced math or science are more likely than others to report that they have been discouraged by teachers, guidance counselors, and principals about their work in math or science.

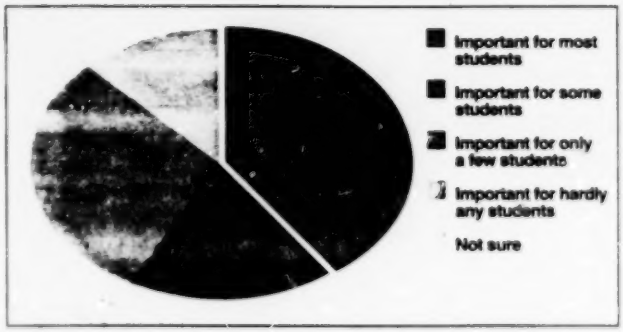
Parents seem to have very little understanding of the discouragement that students experience; they overwhelmingly (93%) say that none of these individuals has discouraged their children from succeeding in math or science classes. Only 1 percent of parents believe that students are discouraged by friends or other family members. While more than one sixth (17%) of younger students say they have been discouraged by their parents, fewer than 1 percent of parents believe they have discouraged their younger children from succeeding in math or science courses.

Similar divergence of opinion is seen among older students and their parents. A large majority (84%) of parents with a child in 9th to 11th grade think that no one has discouraged their child from taking advanced math or science, but a much smaller majority (61%) of high school aged students would agree. The list of possible agents of discouragement includes parents or

Figure 4.
Importance of Teacher and Guidance Counselor Discouragement, Parent vs. Student Attitudes



Parents' attitudes on teacher and guidance counselor discouragement as a reason for students to decide not to take math and science classes.


Important for most students
Important for some students
Important for only a few students
Important for hardly any students
Not sure

Students' attitudes on teacher and guidance counselor discouragement as a reason for students to decide not to take math and science classes.

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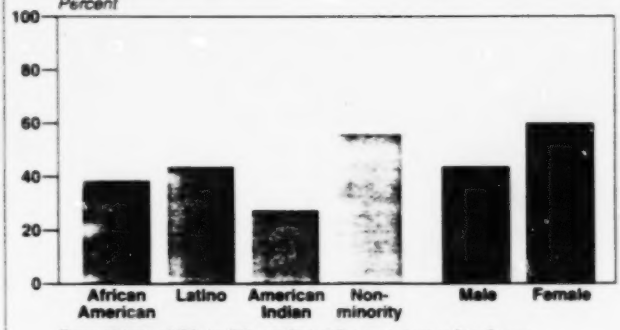
Figure 5.
Students Reporting No Discouragement in Math and Science



Percentage of 5th to 8th graders who say no one has been discouraging about their work in math and science.

guardians, other family members, teachers, guidance counselors, sports coaches or recreation supervisors, principals, religious leaders, club or after school program leaders and college representatives.

Although only a small percentage of older students say they have been discouraged by teachers or guidance counselors, minority 9th to 11th graders are more likely than their nonminority classmates to feel they have been discouraged by faculty and other school staff from taking advanced math or science courses.

Peer pressure is another important factor. Two in ten (21%) students in the upper grades say their friends have discouraged them from taking advanced math and science classes, and a sizable proportion of students say they value their friends' advice when deciding which classes to take. African American (25%) and Latino students (30%) are more likely than American Indian or nonminority students to say their friends have discouraged them from taking more advanced math or science courses, or from succeeding in these subjects.

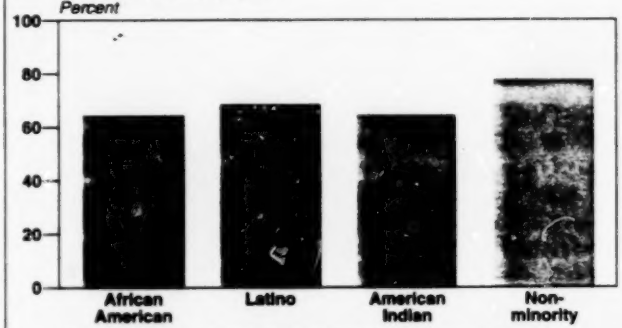
Students' Positive Personal Experiences

Not all students receive the same degree of support or encouragement. Nonminority students report more frequent encouragement from teachers than their minority peers, regardless of grade level (see Figures 6 and 7). Nearly two-thirds (64%) of nonminority 9th to 11th graders, but only about half of Latino (53%), African American (49%) and American Indian (48%) 9th to 11th graders, say they have been encouraged by their teachers to take more advanced math and science classes. Minority 9th to 11th graders are also slightly less likely than their nonminority counterparts to say they have been encouraged by guidance counselors to pursue advanced math and science. In addition, female 9th to 11th graders are more likely than male 9th to 11th graders to feel they have been encouraged by teachers and guidance counselors to take more advanced math and science.

Students' experiences at home are also varied. Almost nine in ten (85%) students in the 5th through 8th grades say their parents have encouraged them to succeed in math and science classes, whereas only seven in ten (69%) students in the 9th to 11th grades say their parents have encouraged them to take more advanced math and science courses.

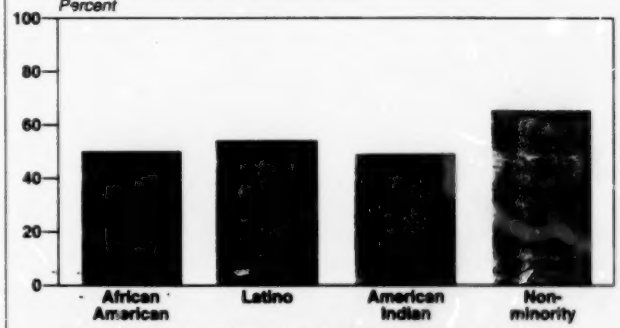
While sizable proportions of high school students say they have received encouragement from other people, such as school principals or sports coaches, virtually no parents with students in high school believe their children are offered this kind of positive support. Fully one-third (30%) of parents with a child in high school believe that no one has encouraged their child to pursue advanced math or science courses.

Figure 6.
Teacher Encouragement of Success in Math and Science



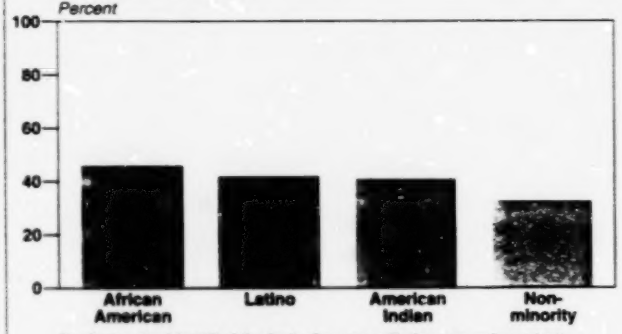
5th to 8th graders who say their teachers encouraged them to succeed in math or science classes.

Figure 7.
Teacher Encouragement to Take Advanced Math and Science Classes



9th to 11th graders who say their teachers encouraged them to take more advanced math or science classes.

Figure 8.
Perception that Schools Do Not Offer Enough Math and Science



Students who identified the lack of course offerings as an important reason for students deciding not to take advanced math and science classes.

Access to Course Offerings

There is evidence that many schools—particularly those serving minority communities—do not offer a full set of academic options in mathematics and science, or do not make students and parents aware that these options exist. Two-fifths of students (39%) say their peers stop taking math and science classes because schools do not offer enough of these courses. Among both 5th to 8th grade and 9th to 11th grade students, minority students are more likely than others to believe their peers decide not to take math and science because their schools do not offer enough of these classes. Most notable are the differences of opinion between minority (40%) and nonminority (32%) students in 9th to 11th grades (see Figure 8).

Minority parents are also more likely than other parents to say that students discontinue their math and science studies because their schools do not offer enough choices. Half (49%) of all minority parents believe this is an important factor, while fewer than two in five (37%) white and Asian parents agree.

Understanding the Importance of Advanced Math

Parents have a better understanding than students of the negative consequences of failing to study advanced math. A majority of parents (72%), but only half of all students (51%), understand that without certain skills, students' career choices will be limited. However, many parents and students are unclear about the concept of foundation or prerequisite academic courses. Only two in five (44%) students and three in five (60%) parents believe that "By not taking certain math classes, like Algebra, a child will not be able to take other classes in the future." Fully half of all parents (53%), but only 16 percent of students believe that students can take any math class they want at anytime they want.

These misconceptions are more common among minority students and parents. Less than one-half of minority students understand that without certain advanced math courses there will be limits on their job possibilities; by contrast, more than half of nonminority students (55%) understand (see Figure 9). In addition, African American (27%), American Indian (29%) and Latino (35%) students are less likely than white and Asian (48%) students to understand that not taking advanced math courses limits their future academic options (see Figure 10).

As compared to white and Asian students (15%), a larger proportion of American Indian (29%), African American (20%) and Latino (20%) students believe they will be able to take whatever classes they want whenever they want, without taking certain prerequisite courses. Minority students are more likely to be unsure of the consequences of not taking Algebra or Geometry; sizable proportions of American Indian (36%), African American (28%), and Latino (22%) students express uncertainty in this regard, as compared to only one-sixth (15%) of their white and Asian classmates.

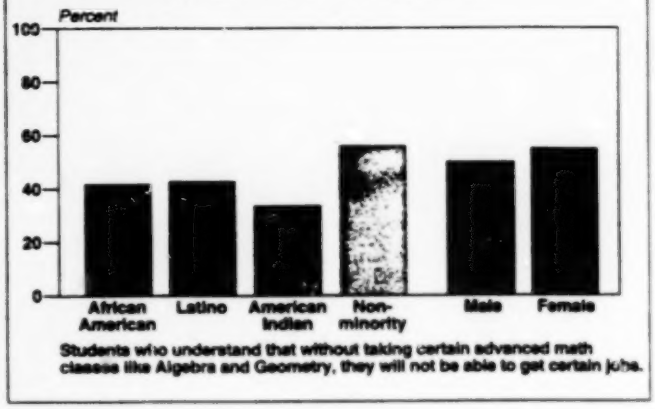
Minority students in the upper grades (21%) and lower grades (20%) are more likely than their nonminority schoolmates (16% and 13%), to think that even without taking advanced math, they will be able to take any class at any time in their academic career. These same students are also less likely to believe their future career options will be affected by decisions regarding their math studies. In particular, one-half (52%) of nonminority older students say that without advanced math courses "I will not be able to get certain jobs," but only one-third (35%) of their minority classmates share the same concern.

Three-fifths (61%) of students who plan to pursue more advanced math fear they will not be able to get certain jobs if they fail to take advanced math courses. In contrast, less than half (46%) of students who plan to drop math as soon as they can share this fear. Similarly, half of students who plan to continue taking math fear that not taking advanced math will limit their future course options. Only four in ten students who plan to drop math as quickly as possible believe they will be limiting their future course options.

One-third (36%) of students who show no interest in taking advanced math or science courses fear that by not taking advanced courses they will not be able to get certain jobs. In contrast, over half (54%) of students who are interested in taking advanced courses share this fear.

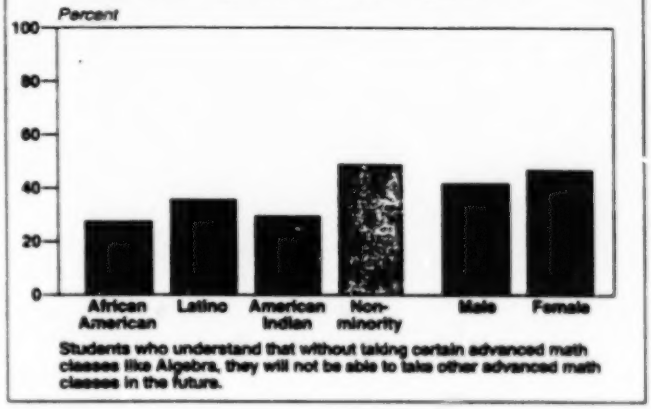
Although less than half of 9th to 11th graders plan to take advanced math classes such as Trigonometry or Algebra 2, nearly two-thirds say they are interested in college level math, including 78 percent of African American students. Almost half (46%) of African American students say they would be "very interested" in taking college level math. These findings clearly indicate than many students are unaware of the prerequisites necessary for college level courses.

Figure 9.
Understanding Career Prerequisites



Students who understand that without taking certain advanced math classes like Algebra and Geometry, they will not be able to get certain jobs.

Figure 10.
Understanding Academic Prerequisites



Students who understand that without taking certain advanced math classes like Algebra, they will not be able to take other advanced math classes in the future.

Advanced Placement Courses

Three-fifths of secondary school students say their schools offer advanced placement or college level math courses. Boys and girls are almost equally likely to say that their schools offer advanced placement or college level courses. Latino and American Indian students, however, are less likely than African American, white or Asian students to say their schools offer advanced placement or college level math courses, and they are much more likely to be unsure.

Students who plan to keep taking math and those who are interested in taking advanced classes are more likely than those who do not plan to keep taking math and those who are not interested in advanced classes to believe that their schools offer these classes.

Academic Aspirations Exceed Preparation

Many students have long term ambitions that exceed the level of academic preparation they have chosen or plan to pursue. Although large numbers of students will not complete the math and science courses required for college entrance examinations, almost nine in ten students (86%) would like to go to college. Similarly, nine-tenths of parents (91%) expect their children will attend college after finishing high school.

African American (90%) and female students (90%) are more likely than their peers to say they would like to attend college. By comparison, smaller majorities of boys (83%), Latino (83%), or white and Asian (86%) students say they would like to attend college. Most noticeably, fewer than two-thirds of American Indian students (63%) say they want to attend college. American Indian (29%) and Latino (14%) students are more likely to be unsure if they want to go to college, or not.

The disparity between aspirations and high school course-taking plans is compounded by students' and parents' more specific academic ambitions. Two-fifths (42%) of students who would like to go to college say they would like to study scientific subjects such as biology, computers, engineering, nursing, mathematics, medicine, or physics. Over half (54%) of all parents who would also like to see their children attend college would like them to study scientific subjects.

For both students (12%) and parents (11%), business subjects such as accounting, advertising, and marketing follow after scientific subjects. Ten percent of students would like to concentrate on fine arts such as music, painting, or film-making, while only 4 percent of parents would like their children to study fine arts. A quarter of students (25%) are not sure what they want to study in college, and 13 percent of parents are also unsure about what their child's academic focus should be.

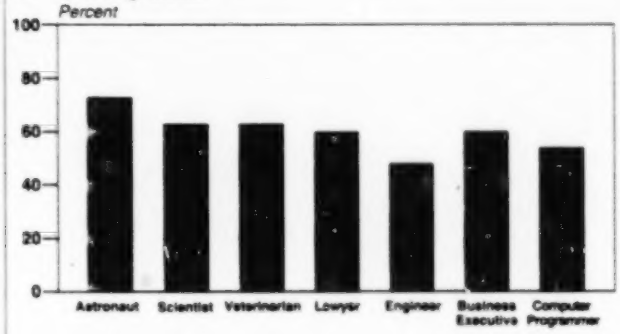
Over one-third (35%) of students who plan to stop taking math as soon as possible would prefer to study scientific subjects in college. Similarly, one-fourth of students who are not interested in or have not chosen advanced math and science courses in high school would still like to study scientific subjects more than other subjects if they attend college.

Despite lower levels of interest in advanced high school math and science courses, and a greater likelihood that they will only study math and science as long as necessary, minority high school students are most likely to express an interest in studying scientific subjects in college; 45 percent say this as compared with 42 percent of older nonminority students and 38 percent of younger minority students.

A majority of students who plan to stop taking math as soon as they can say they are interested in learning more about computer technology and designing video games, fields that require a background in math. Substantial minorities of students who plan to drop math express an interest in learning more about space exploration, electronics, and environmental clean-up.

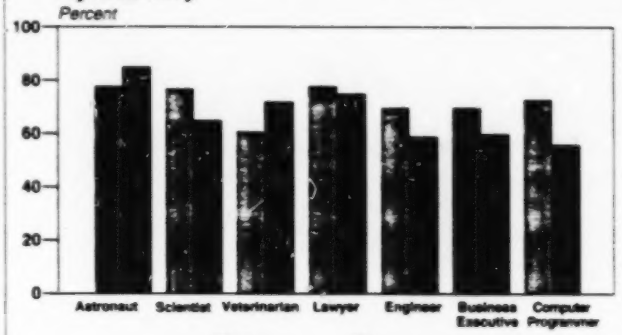
Older minority students are equally or more likely than their nonminority

Figure 11.
Career Interests of Students Who Plan to Drop Math



Percent of all students who plan to drop math who believe the listed careers would be "interesting."

Figure 12.
Career Interests of High School Students, By Ethnicity



Percent of 9th to 11th grade students who believe the listed careers would be "interesting."

classmates to express an interest in technologically advanced fields such as designing video games (50% vs. 39%), electronics (40% vs. 36%), and telecommunications (34% vs. 31%).

Future Career Interests

Students' misconceptions about the impact of their decisions regarding math and science studies are underscored by an examination of their professional interests. Although many students want to discontinue their studies as quickly as possible, they still express interest in careers that require extensive knowledge of math and science (see Figure 11).

Almost four-fifths (77%) of minority 9th to 11th graders feel that being a scientist would be interesting, and two-thirds (65%) of nonminority 9th to 11th graders agree. Similarly, more than two-thirds (70%) of 9th to 11th grade minority students feel that being an engineer would be interesting, but less than three-fifths (59%) of nonminority 9th to 11th graders feel the same (see Figure 12). Substantial majorities of students who plan to stop taking math as soon as they can believe that being an astronaut or scientist would be interesting, and almost half feel that being an engineer would be interesting.

Three-fifths (59%) of all students say that being a computer programmer would be interesting and 81 percent of parents think there is real possibility that their children could become computer programmers. Parents as a group are evenly split on professions such as being a scientist (52% vs. 47%), veterinarian (51% vs. 48%), and artist (47% vs. 52%) as a real possibility for their children. Students, on the other hand, are more likely than not to believe these would be interesting careers; two-thirds of students think that being a scientist (66%) or veterinarian (66%) would be interesting.

Succeeding in Math and Science Classes

Almost half (44%) of students believe math is harder than other subjects, in contrast to only three in ten (30%) parents who believe their children find math harder than other subjects. Parents of girls are more likely than parents of boys to feel that their children find math harder than other subjects. And many students believe success is based on innate talent rather than effective teaching. Only 16 percent of students say that having a special talent for numbers is not important for success in math and science. 81 percent believe it is at least somewhat important. Older students are more inclined than younger students to believe that having a special talent for numbers is at least somewhat important (86% vs. 77%).

Students who have discussed their future math options with an adult (87%) are more likely to think a special talent for numbers is important than are students who have not discussed future math options (80%), students that say they do not have an option (70%), and students who are not sure of their future options in math (69%). This suggests that the school environment may be reinforcing these views by encouraging only those students who seem to need the least encouragement in terms of pursuing mathematics.

A large majority (93%) of parents with children in public school also believe that having a special talent for numbers is at least "somewhat" important. More than half (53%) of minority parents with children in kindergarten to ninth grade think it is very important to have a special talent with numbers. By comparison, minority parents with older children, in 10th to 12th grade, are somewhat less likely to believe this is a very important ingredient for success (45%).

Parents who have no college experience (48%) are twice as likely as parents who have at least a college education (24%) to say that having a special talent for numbers is a very important part of succeeding in math and science studies.

Nine in ten students (88%) and parents (91%) think that being "smart" is impor-

tant for doing well in math and science. Minority parents (57%) are more inclined than nonminority parents (33%) to believe that being smart is very important for doing well in math and science. Almost half of all parents with less than a college education (46%) say that being smart is very important. By comparison, only one-third of the parents with a college education (30%), as well as a third of parents with some college experience (32%), believe that being smart is a key attribute that students must have in order to do well in math and science.

As with parents, minority students between the 5th and 8th grade are more likely (71%) than others to believe that being smart is very important for doing well in math and science. By comparison, only three-fifths (60%) of nonminority younger students believe this is a very important requirement for doing well in math and science. Large majorities of students (84%) and parents (93%) agree that studying is a very important part of doing well in math and science classes.

Observations and Implications

Across the board, the expectations of American parents about their children's academic futures are higher than the futures these children are being prepared for in school. More parents expect their children to attend college than will actually go, and there are college-entrance requirements that sizable proportions of students and parents are not aware of, and are not meeting. Similarly, many students hold unrealistic expectations about their future career options, particularly in fields that require a background in math and science. This survey finds a clear and consistent gap between the expectations that children and parents have for the future and their understanding of the steps necessary to enter the professions to which they aspire.

Parents who assume their children will go to college frequently allow their children to make very important academic decisions about the study of advanced math and science with little or no guidance or advice. Of students and parents who are aware of the math options students face, only a third receive guidance from school officials (i.e., math teachers, guidance counselors and other teachers) to help them make decisions. Yet many students value the support and advice of teachers and guidance counselors. Parents are less cognizant of the role that faculty and other school staff can (and do) play in their children's lives, and they are frequently unaware of both the negative messages that school staff sometimes conveys as well as their positive influence on students' lives.

The role of teachers and guidance counselors is particularly disturbing in light of the consistent differences of opinion and experiences between minority and nonminority students. Minority students—whose parents are less likely to have had personal experience with college application requirements and the prerequisites needed for advanced studies—must rely on their schools to provide an understanding of the repercussions of secondary school choices in math and science. These very same students are more often discouraged from pursuing advanced studies and are less likely to receive positive advice or to have a teacher or counselor assist them with course decisions. In addition, minority students often attend schools where academic choices are more limited, regardless of their interest in more advanced coursework.

Large numbers of minority students express a desire learn about fields such as computer science, engineering, nursing and mathematics, and the data indicate that their interest does not elicit an adequate response from faculty and other school staff. Minority students are more likely than nonminority students to express an interest in these career options, but they are also more likely to leave high school unqualified and without the guidance and support that can lead to academic achievement in these fields of study.

The survey findings raise questions about the role schools play in guiding students' futures and about the extent to which students' decisions are swayed by messages they receive from teachers, counselors, and their peers. Many of these issues require a fuller understanding of teachers' experiences and concerns, as well as those of parents and children. Nonetheless, the survey provides actionable findings that must be addressed if educators and parents hope to improve the level of realistic preparedness among minority students for future career opportunities in fields such as science and engineering. One critical step is assuring a clearer understanding of the academic decisions that students make in secondary school. Without such improvements, the job opportunities in these fields will continue to expand, and uninformed and unguided decisions about math and science studies will lead to a work force unable to meet the demand. ≡

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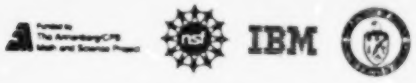

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